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RESEARCH UPDATE

The Nutraceutical Value of Strawberries and Black Raspberries to Inhibit Cancer

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"Cancer is the second leading cause of death in the United States, exceeded only by heart disease," according to the American Cancer Society's Cancer Facts and Figures 2002. "In the United States, one in four deaths is from cancer." To address this expensive and deadly disease, the Society has identified cancer research and prevention as one of its top priorities. Foods that are eaten as preventative measures against disease are known as functional foods. Examples of functional foods are strawberries and black raspberries, which contain chemicals (nutraceuticals) that have the potential to inhibit the development of certain cancers.

This interdisciplinary research team started with determining the highest quality and potentially most effective cultivars of strawberries and black raspberries. Berries were evaluated for the chemicals that would be most effective in cancer inhibition. Part of this evaluation included looking at cultural practices to determine which practices produced berries having maximum beneficial chemicals. In addition, processing methods and their effects on these chemicals were evaluated.

This SEEDS describes research evaluating the ability of freeze-dried strawberries and black raspberries to inhibit esophagus and colon cancers. Both types of berries exhibited inhibitory effects on cancer development in laboratory rodents through multiple mechanisms including reducing DNA damage and slowing the growth rate of premalignant cells. Investigations with various berry extracts indicate that they inhibit chemically induced cell transformation, exhibit antioxidant activity, and decrease production of proteins associated with cellular growth.

OBJECTIVES

The objectives of this research are to:

- Determine the ability of freeze-dried berries and berry extracts to prevent the development of cancer of multiple organs.
- Determine the mechanism(s) by which berries inhibit cancer.
- Identify the active inhibitory compounds in berries.
- Determine if consumption of freeze-dried berries in humans leads to toxic effects and measure the uptake of preventive components in berries into the blood of humans eating berries.

CHALLENGES

The challenge of this work is to identify whether freeze-dried berries have any preventative effect on cancer and to determine how this prevention works.

ACHIEVEMENTS

Researchers found that freeze-dried berries prevent cancer in the esophagus and colon of rodents by reducing the ability of carcinogens to cause damage in tissues and cells, and by preventing premalignant cells from progressing to malignancy.

It was also found that berries are nontoxic to humans when consumed in large quantities. In addition, berries are strong antioxidants and are likely to be protective against diseases other than cancer, such as cardiovascular disease, and berries may slow the aging process.

THE FUTURE

Results of this research suggest that berries might effectively prevent cancer in humans. However, human clinical trials are essential to confirm these preliminary results.

Researchers plan to identify the active cancer preventative chemicals in berries, especially black raspberries. Other future plans include clinical trials to determine if freeze-dried berries inhibit cancer development in patients with Barrett's esophagus. Barrett's esophagus, a premalignant lesion that can progress to esophageal cancer, is increasing at an alarming rate in the United States.

Clinical trials are also planned to determine if freeze-dried berries reduce the recurrence rate of polyps in the colon of individuals who have had polyps removed during colonoscopy. Recurrent polyps are often more aggressive than the polyps that were removed and can progress to cancer.

A patent has been filed with the U.S. Patent and Trademark Office entitled "Compositions Derived From Strawberry and Raspberry and Therapeutic Uses Therefore." This research is supported, in part, by state of Ohio funds allocated to the Ohio Agricultural Research and Development Center of The Ohio State University.

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